CLAIMS

1. A method comprising:

transmitting a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the second plurality of alternate tones are mirror tones of the tones in the first plurality of alternate tones.

2. The method of claim 1, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

3. The method of claim 1, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

4. The method of claim 3, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

5. The method of claim 1, wherein said transmitting comprises transmitting in a system selected from a multiple-in-multiple-out (MIMO) system, a single-in-multiple-out (SIMO) system, a multiple-in-single-out (MISO) system, and a single-in-single-out (SISO) system.

6. The method of claim 1, wherein said transmitting comprising transmitting in a system selected from an IEEE 802.11a system, an IEEE 802.11g system, and an IEEE 802.16 system.

7. The method of claim 1, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

8. A method comprising:

receiving a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the second plurality of alternate tones are mirror tones of the tones in the first plurality of alternate tones; and

performing channel estimation using said first and second pilot symbols.

9. The method of claim 8, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

10. The method of claim 8, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

11. The method of claim 10, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

12. The method of claim 10, further comprising:

performing a frequency offset estimation operation using the first and third pilot symbols.

13. The method of claim 8, wherein said receiving comprises receiving in a system selected from a multiple-in-multiple-out (MIMO) system, a single-in-multiple-out (SIMO) system, a multiple-in-single-out (MISO) system, and a single-in-single-out (SISO) system.

14. The method of claim 8, wherein said receiving comprising receiving in a system selected from an IEEE 802.11a system, an IEEE 802.11g system, and an IEEE 802.16 system.

15. The method of claim 8, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

16. An apparatus comprising:

a formatter to generate a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the first plurality of alternate tones are mirror tones of the tones in the second plurality of alternate tones.

17. The apparatus of claim 16, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

18. The apparatus of claim 16, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

19. The apparatus of claim 18, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

20. The apparatus of claim 16, wherein the formatter is operative to format data according to a standard selected from an IEEE 802.11a standard, an IEEE 802.11g standard, and an IEEE 802.16 standard.

21. The apparatus of claim 16, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

22. An apparatus comprising:

a channel estimation module operative to

receive a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the first plurality of alternate tones are mirror tones of the tones in the second plurality of alternate tones; and

perform channel estimation using said first and second pilot symbols.

23. The apparatus of claim 22, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

24. The apparatus of claim 22, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

25. The apparatus of claim 24, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

26. The apparatus of claim 24, further comprising:

a frequency offset estimation module to perform a frequency offset estimation operation using the first and third pilot symbols.

27. The apparatus of claim 22, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

28. An OFDM (Orthogonal Frequency Division Multiplexing) pilot symbol structure comprising:

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the second plurality of tones are mirror tones of the tones in the first plurality of tones.

29. The pilot symbol structure of claim 28, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

30. The pilot symbol structure of claim 28, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

31. The pilot symbol structure of claim 30, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

32. The pilot symbol structure of claim 28, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

33. An apparatus comprising:

means for generating a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the first plurality of alternate tones are mirror tones of the tones in the second plurality of alternate tones.

34. The apparatus of claim 33, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

35. The apparatus of claim 33, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

36. The apparatus of claim 35, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

37. The apparatus of claim 33, wherein the means for generating is operative to format data according to a standard selected from an IEEE 802.11a standard, an IEEE 802.11g standard, and an IEEE 802.16 standard.

38. The apparatus of claim 33, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

39. An apparatus comprising:

means for channel estimation, said means including

means for receiving a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the first plurality of alternate tones are mirror tones of the tones in the second plurality of alternate tones; and

means for performing channel estimation using said first and second pilot symbols.

40. The apparatus of claim 39, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

41. The apparatus of claim 39, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

42. The apparatus of claim 41, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

43. The apparatus of claim 41, further comprising:

means for frequency offset estimation, said means including means for performing a frequency offset estimation operation using the first and third pilot symbols.

44. The apparatus of claim 39, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

45. A computer program comprising:

generating a pilot symbol structure for transmission, said pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the second plurality of alternate tones are mirror tones of the tones in the first plurality of alternate tones.

46. The computer program of claim 45, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

47. The computer program of claim 45, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

48. The computer program of claim 47, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

49. The computer program of claim 45, wherein said generating comprises generating the pilot symbol structure for transmission in a system selected from a multiple-in-multiple-out (MIMO) system, a single-in-multiple-out (SIMO) system, a multiple-in-single-out (MISO) system, and a single-in-single-out (SISO) system.

50. The computer program of claim 45, wherein said generating comprises generating the pilot symbol structure for transmission in a system selected from an IEEE 802.11a system, an IEEE 802.11g system, and an IEEE 802.16 system.

51. The computer program of claim 45, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

52. A computer program comprising:

receiving a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the second plurality of alternate tones are mirror tones of the tones in the first plurality of alternate tones; and

performing channel estimation using said first and second pilot symbols.

53. The computer program of claim 52, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

54. The computer program of claim 52, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

55. The computer program of claim 54, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

56. The computer program of claim 54, further comprising:

performing a frequency offset estimation operation using the first and third pilot symbols.

57. The computer program of claim 52, wherein said receiving comprises receiving in a system selected from a multiple-in-multiple-out (MIMO) system, a single-in-multiple-out (SIMO) system, a multiple-in-single-out (MISO) system, and a single-in-single-out (SISO) system.

58. The computer program of claim 52, wherein said receiving comprising receiving in a system selected from an IEEE 802.11a system, an IEEE 802.11g system, and an IEEE 802.16 system.

59. The computer program of claim 52, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

60. A system comprising:

one or more antennas to transmit signals; and

a transmit section to generate the signals for transmission from the one or more antennas, the transmit section including

a formatter to generate a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the first plurality of alternate tones are mirror tones of the tones in the second plurality of alternate tones.

61. The system of claim 60, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

62. The system of claim 60, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

63. The system of claim 62, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

64. The system of claim 60, wherein the formatter is operative to format data according to a standard selected from an IEEE 802.11a standard, an IEEE 802.11g standard, and an IEEE 802.16 standard.

65. The system of claim 60, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

66. The system of claim 60, wherein the system is selected from a multiple-in-multiple-out (MIMO) system, a single-in-multiple-out (SIMO) system, a multiple-in-single-out (MISO) system, and a single-in-single-out (SISO) system.

67. A system comprising:

one or more antennas to receive signals; and

a receive section to receive the signals from the one or more antennas, the receive section including

a channel estimation module operative to

receive a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the first plurality of alternate tones are mirror tones of the tones in the second plurality of alternate tones; and

perform channel estimation using said first and second pilot symbols.

68. The system of claim 67, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

69. The system of claim 67, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

70. The system of claim 69, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

71. The system of claim 69, further comprising:

a frequency offset estimation module to perform a frequency offset estimation operation using the first and third pilot symbols.

72. The system of claim 67, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

73. The system of claim 67, wherein the system is selected from a multiple-in-multiple-out (MIMO) system, a single-in-multiple-out (SIMO) system, a multiple-in-single-out (MISO) system, and a single-in-single-out (SISO) system.

74. A system comprising:

means for transmitting signals in a wireless channel; and

means for generating the signals for transmission, said means including

means for generating a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the first plurality of alternate tones are mirror tones of the tones in the second plurality of alternate tones.

75. The system of claim 74, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

76. The system of claim 74, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

77. The system of claim 76, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

78. The system of claim 74, wherein the means for generating the pilot symbol structure is operative to format data according to a standard selected from an IEEE 802.11a standard, an IEEE 802.11g standard, and an IEEE 802.16 standard.

79. The system of claim 74, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

80. The system of claim 74, wherein the system is selected from a multiple-in-multiple-out (MIMO) system, a single-in-multiple-out (SIMO) system, a multiple-in-single-out (MISO) system, and a single-in-single-out (SISO) system.

81. A system comprising:

means for receiving signals from a wireless channel; and

means for estimating said wireless channel, said means including

means for receiving a pilot symbol structure including

a first pilot symbol including pilot information on a first plurality of alternate tones, and

a second pilot symbol including pilot information on a second plurality of alternate tones, wherein the tones in the first plurality of alternate tones are mirror tones of the tones in the second plurality of alternate tones; and

means for performing channel estimation using said first and second pilot symbols.

82. The system of claim 81, wherein the first pilot symbol and second pilot symbol comprise OFDM (Orthogonal Frequency Division Multiplexing) symbols.

83. The system of claim 81, wherein the pilot symbol structure further includes a third pilot symbol, the third pilot symbol being identical to the first pilot symbol.

84. The system of claim 83, wherein the third pilot symbol is between the first pilot symbol and the second pilot symbol.

85. The system of claim 83, further comprising:

means for frequency offset estimation, said means including means for performing a frequency offset estimation operation using the first and third pilot symbols.

86. The system of claim 81, wherein in the first and second pilot symbols, the tones not containing pilot information are nulled out.

87. The system of claim 81, wherein the system is selected from a multiple-in-multiple-out (MIMO) system, a single-in-multiple-out (SIMO) system, a multiple-in-single-out (MISO) system, and a single-in-single-out (SISO) system.